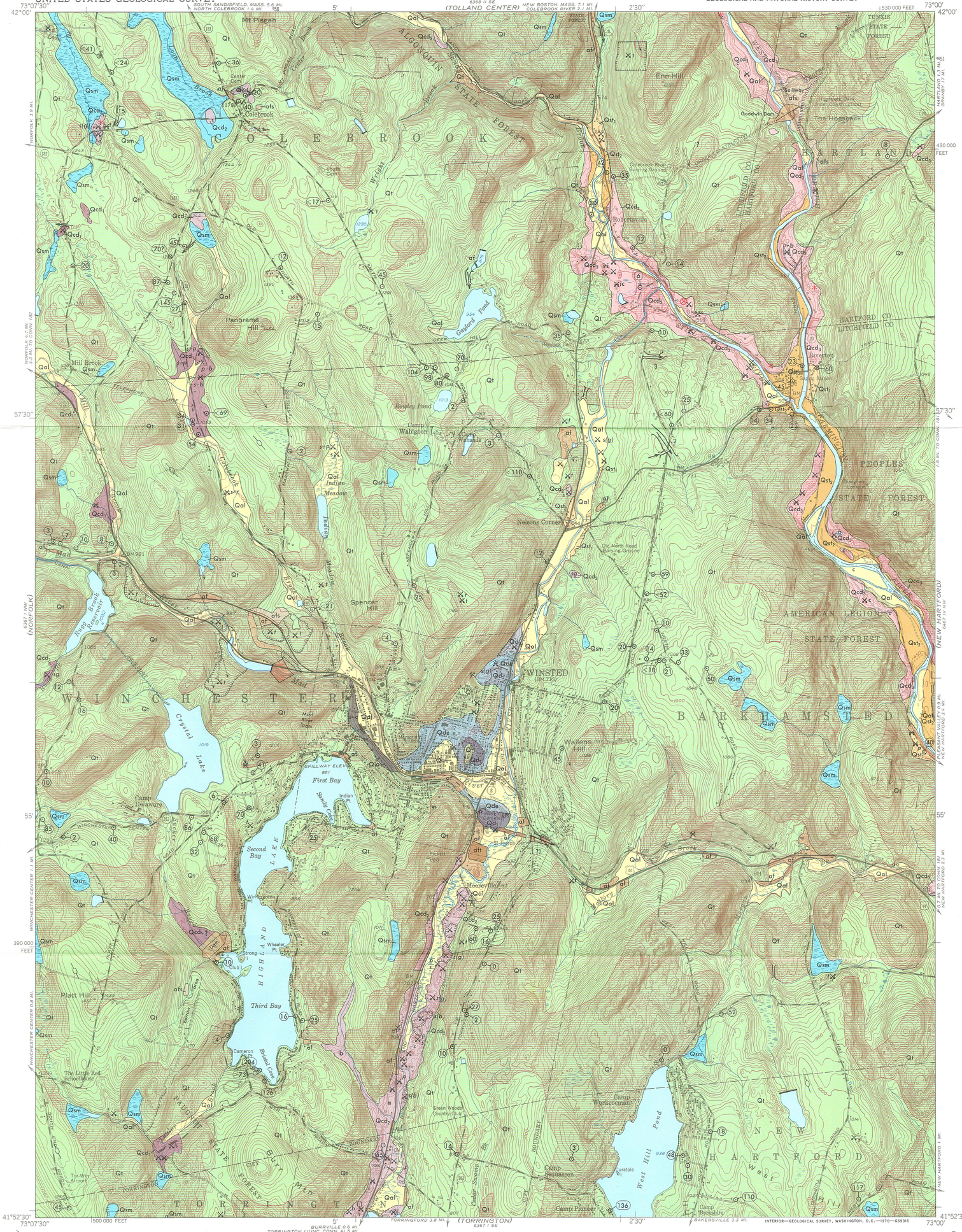
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
STATE OF CONNECTICUT
GEOLOGICAL AND NATURAL HISTORY SURVEY

GEOLOGIC QUADRANGLE MAP
SURFICIAL GEOLOGY
WINSTED QUADRANGLE, CONNECTICUT
GQ–871



EXPLANATION

Qal — Alluvium
Stratified silt, sand, and gravel in areas subject to flooding by streams; contains many cobbles in valley of West Branch Farmington River and consists chiefly of boulders, as much as 14 feet in maximum diameter, at some places on Sandy Brook. Holocene material at surface probably overlies stratified drift of Pleistocene age in many places

Qsm — Swamp and marsh deposits
Organic matter, undecomposed to partly decomposed. In places mixed with silt and sand, in other places pure peat. Chiefly of Holocene age, but in places bottom part of the deposit is possibly of Pleistocene age

Qst2 / Qst1 — Stream-terrace deposits
Stratified gravel, sand, and silt. Terraces Qst1 *stood above the level of the 1955 flood; probably most or all of the material is stratified drift of Pleistocene age. Terraces* Qst2 *carry at least a veneer of Holocene material, and the terrace north of West Branch Farmington River where it leaves the quadrangle has at least several feet of Holocene material*

Qt — Fan deposits
Chiefly coarse gravel; the fan of Wright Brook includes many boulders 4–6 feet in maximum diameter. Probably chiefly or wholly of Pleistocene age, but possibly of Holocene age

Qcd3 / Qcd2 / Qcd1 — Ice-contact stratified drift
Chiefly sand and gravel.
Qcd1, *material is predominantly sand but ranges from silt to boulders; inferred to have been deposited by melt waters from ice of the earlier advance, from the north-northwest*
Qcd2, *material commonly contains rounded cobbles and small boulders, and scattered larger angular boulders as much as 30 feet in diameter; in places deposits are faulted, or bedding is steep to vertical; inferred to be derived from ice of the later readvance, from east of north, and deposited largely or entirely before the time of glacial Lake Winsted*
Qcd3, *material is commonly cobbly and bouldery; in areas of abundant bedrock exposures material is discontinuous and thin; deposited largely or entirely after Lake Winsted was drained. Symbol* ic *identifies a probable ice-channel deposit (crevasse filling)*

Qde — Deltaic deposits
Sand and pebble gravel, commonly well sorted, deposited in glacial Lake Winsted
Qde, *eroded surfaces cut on deltaic materials, in part in Holocene time. Distinctive grain sizes are indicated by letter symbols (see pit symbols, below)*

Qio — Inwash (and outwash?) deposit
Gravel, in part cobble gravel, and sand deposited by Mad River. Deposition was probably graded to the high local baselevel when glacial Lake Winsted was at its early, high-level (755–foot) stage

Holocene / Late Wisconsin / Pleistocene / QUATERNARY

Qt — Till
Nonsorted to poorly sorted mixture of sand with silt, clay, rock flour, and angular to rounded stones as much as 30 feet in maximum diameter; loose to moderately compact. Pockets or lenses of stratified sand and gravel commonly present. In areas of abundant bedrock exposures discontinuous, and commonly less than 10 feet thick; includes many swampy areas in which undecomposed to partly decomposed organic matter is present near the surface, and on some steep slopes includes areas of talus. In areas lacking abundant bedrock exposures thickness ranges from less than 1 foot (as near scattered outcrops) to a reported 204 feet

af / aft / afs — Artificial fill
Includes the larger graded areas. In most places consists chiefly or entirely of till material, but sand, gravel, and broken rock are present in places. Small fills and graded areas are not shown
aft, *trash fill*
afs, *spoil dump from construction of nearby dam*

Area of abundant bedrock exposures

Contact
Dashed where approximately located

Weathered bedrock
Exposed in a pit in stratified drift

Triassic pebble locality
Pebble or group of pebbles of red arkosic sandstone or of red shale, believed to be derived from the Triassic rocks of the Connecticut Valley

Grooves or striae
Showing inferred direction of ice movement; point of observation is at tip of arrow. Double-arrow symbol indicates a locality where grooves trending approximately S. 20° E. are crossed by doubtful grooves trending approximately N–S and S. 18° W.

Long axis of streamline till deposit
Either a drumlin, or a till ridge or spur that extends upstream (toward direction from which the ice came) from a bedrock obstruction and is inferred to reflect the direction of ice movement

Melt-water channel
Dry channel carved by melt-water stream or the outlet of an ice-dammed lake (generally omitted in areas of abundant bedrock exposures). Arrow indicates inferred direction of stream flow. Numbers identify inferred successive positions of outlet of glacial Lake Winsted

Inactive pit · Abandoned pit · Abandoned quarry
Larger pits and areas of multiple pits are hachured to show approximate boundaries. Pits and quarries identified as abandoned appear not to have been worked for at least several years
Materials are identified as follows:
b, bouldery gravel
c, cobbly gravel
p, pebble gravel
s, sand
vfs, very fine sand
f, silt
gs, gravel and sand, gravel estimated to constitute more than 50 percent of the deposit
sg, sand and gravel, sand estimated to constitute more than 50 percent of the deposit
s(g), sand with minor amounts of gravel
t, till
Read dash between symbols as "to". Superposition of symbols (such as p/s *) incidates superposition of materials*

Selected well
Figure shows reported depth to bedrock in feet. Symbol <21 indicates depth to bedrock is less than 21 feet; generally means only casing depth is available. Symbol >45 indicates depth to bedrock is more than 45 feet; well did not reach bedrock

Base by U.S. Geological Survey, 1956
Roads and drainage modified as of 1969
10,000-foot grid based on Connecticut coordinate system

Geology mapped, 1966–67

SCALE 1:24 000

1 MILE
1 KILOMETER

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1970

QUADRANGLE LOCATION

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1970—G69316

SURFICIAL GEOLOGIC MAP OF THE WINSTED QUADRANGLE, LITCHFIELD AND HARTFORD COUNTIES, CONNECTICUT

By
Charles R. Warren

1970

For sale by U. S. Geological Survey, price $1.00

DEPARTMENT OF THE INTERIOR
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TO ACCOMPANY MAP GQ-871

SURFICIAL GEOLOGIC MAP OF THE WINSTED QUADRANGLE, LITCHFIELD AND HARTFORD COUNTIES, CONNECTICUT

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INTRODUCTION

The Winsted quadrangle lies in the Western Upland of Connecticut, in Litchfield and Hartford Counties, and has a total relief of approximately 1,050 feet. A trough, followed by State Route 8, trends east of north across the quadrangle. West of this trough, a steep scarp rises to high ground; east of it, elevations are generally lower.

Most of the surficial deposits in the quadrangle are till deposited by glacier ice in the Pleistocene Epoch. Most of the rest are stratified drift deposited by melt water from the ice. The remaining deposits were formed in postglacial time; glacial erosion removed all preglacial soil and most weathered rock.

The distribution of swamp and marsh deposits and of areas of abundant bedrock exposures was inferred in part from U.S. Department of Agriculture soil maps; the soil map of Litchfield County was kindly made available, in advance of publication, by George F. Sweeney of the Soil Conservation Service. The Connecticut State Water Commission provided information on water wells.

PRE-WISCONSIN CENOZOIC HISTORY

Little is known about the Cenozoic history of the Winsted quadrangle before late Wisconsin time. Topographic evidence suggests Pleistocene drainage changes. A fissile till of possible pre-Wisconsin age has been found in nearby areas.

Drainage changes.—Mad River evidently once drained southeast across the quadrangle, but was captured and diverted by Still River (Hobbs, 1901). The till at and northeast of St. Joseph Cemetery blocks the old valley, whose beheaded downstream portion is occupied by Mallory and Morgan Brooks (Mohawk Brook of Hobbs). Sucker Brook probably also extended farther southeast in preglacial time, draining to the Torrington quadrangle via Cedar Swamp Brook. If so, it has been dismembered not only by Still River, but also at Highland Lake. A gravel-filled valley, barbed to Still River, may mark its former course southeast from the southern part of Third Bay.

The capture and diversion of Mad River, and the probable captures of the extended Sucker Brook, probably took place in Pleistocene time. The valleys of Still River and Highland Lake are parallel and evidently subsequent, carved along zones of weakness in the bedrock; Hobbs (1901) inferred that a belt of limestone determined the location of Still River. The carving was undoubtedly begun by local runoff in preglacial time, but the bedrock floor under Still River does not slope southward, as Hobbs' glacial reversal hypothesis requires, and the longer route via Robertsville would not give an erosional advantage to effect preglacial captures by conventional stream piracy. Glacial erosion whose depth decreased southward could account for the northward slope of the valley of Still River, and evidence at Highland Lake suggests that glacial scour was deep. Second Bay probably occupies a rock basin, and if the reported depth of 204 feet to bedrock at Bristol Cove is correct, a rock basin under Third Bay must have a closure of more than 100 feet.

If the Still River and Highland Lake valleys were carved by glacier ice, ice probably moved powerfully across this quadrangle in a south-southwest direction at some time before late Wisconsin time.

Fissile till.—No unconsolidated materials older than late Wisconsin have been found in the quadrangle. In the Tolland Center quadrangle 1.2 miles north of the Winsted border, however, a compact, jointed, fissile till with brown oxide developed along the joints is exposed just west of the mapped alinement of State Route 8. This material probably correlates with similar fissile till to the south (Colton, 1968; Warren, unpub. data), which Pessl and Schafer (1968) believe to be older than the prevailing friable till of late Wisconsin age. Although this older, possibly pre-Wisconsin till has not been recognized in the Winsted quadrangle, it is doubtless present in places, perhaps buried beneath the younger till. Northwest-southeast glacial grooves on a rock knob near the Tolland Center exposure are more westerly than most glacial grooves in the area. Possibly the ice that deposited the fissile till was moving southeastward.

LATE WISCONSIN GLACIAL ADVANCES

Glacier ice of a late Wisconsin advance, probably from the north-northwest, swept the area so clean that few if any older Cenozoic deposits survived. The latest ice to reach the quadrangle apparently came from the northeast or north-northeast.

Probable north-northwest ice.—The prevailing till in the quadrangle is more friable than the fissile till described above, and lacks the jointing and associated staining. It would be assumed to correlate with the upper till of Pessl and Schafer (1968), except that available evidence suggests that much of it was deposited by ice that moved south-southeast, whereas Pessl (written commun., 1968) now believes that their younger till was deposited by ice that moved southwest.

At every locality where glacial grooves or striae or both were found in the area, the dominant grooves trend S. 5°–35° E., and nearly all fall in the range S. 15°–25° E. In the borrow pits northwest of Eno Hill and north of Crystal Lake, such grooves are in rock overlain by till that could not be distinguished by the

author from the till in other exposures. All recognized drumlins have similar south-southeast trends. Apparently the dominant glacial features were formed by ice that came from the north-northwest.

Probable northeast ice.—Three lines of evidence suggest that at least part of the quadrangle was later invaded by ice from the northeast or north-northeast. The first of these is some doubtful glacial grooves at outcrops east of the relocated Colebrook River Burying Ground, north of the road to Goodwin Dam (shown on the map as Hogsback Dam). Here the dominant grooves, bearing S. 17°–24° E., are crossed by less distinct grooves bearing N–S and S. 18° W. Second, in the Tolland Center quadrangle to the north, G. W. Holmes (oral commun., 1968) has mapped drumlins trending southwest as well as southeast; if ice moved southwest across that area with sufficient force to mold drumlins, it must have entered at least the northern part of this quadrangle. And third, one to six pebbles believed to be derived from the Triassic rocks of the Connecticut Valley (red arkosic sandstone, red shale, or both) were found at each of four localities in the north part of the Winsted quadrangle. Although these stones might conceivably have been carried westward by superglacial streams, it is unlikely on ice that sloped south-southeast. Taking this evidence in conjunction with evidence in nearby areas (Colton, unpub. data; Warren, unpub. data; Pessl and Schafer, 1968), it seems probable that a late readvance of ice entered the Winsted quadrangle from east of north.

The actual limits that the late ice reached are only roughly inferred, in part from morainelike deposits believed to have been made during the retreat of this ice.

Morainelike ridges.—At three places east-west ridges that form divides transverse to troughlike valleys are composed at least partly of till and partly or possibly partly of stratified drift.

The road east from corner 1244, 0.8 mile southwest of Colebrook village, follows a divide that consists of till with a hummocky surface on the north side and of stratified drift with ice-contact topographic forms on the south side. A ridge east from Hemlock Cemetery, on State Route 8 near the Winchester/Colebrook town line, consists partly of till and perhaps partly of stratified drift, especially on its south side. This ridge blocks what may be a former valley of Still River, diverting that stream across bedrock to the east. Northwest of Eno Hill, 0.1 mile south of the quadrangle border, the mapped alinement of State Route 8 utilizes a gap cut by melt water through an east-west ridge transverse to a throughgoing bedrock valley. This east-west ridge consists partly of till and partly of stratified drift, especially on its south side.

These three short ridges seem to be analogous to retreatal moraines, each marking a temporary stillstand position of the margin of active ice. The ridge southwest of Colebrook is within a mile of a Triassic pebble locality, and is probably within the area covered by the ice from the northeast; it may be only a short distance north of the drift border of that ice at this longitude. Farther east, the late ice probably occupied the Still River valley to points south of the quadrangle. Its extent on the higher ground east and west of Still River, as near Highland Lake and West Hill Pond, is uncertain.

If these inferences are correct, the till in the morainelike ridges, and perhaps much of the surficial till in the northeastern part of the quadrangle, was deposited by the ice from the northeast. No internal criteria have yet been recognized by which this till can be reliably distinguished from the probably more widespread till of the earlier ice from the north-northwest. Detailed pebble counts or till-fabric analyses may provide such criteria in the future.

DEGLACIATION

The ice of the earlier Wisconsin advance, from the north-northwest, apparently wasted chiefly by sublimation rather than by melting, since in this quadrangle and farther south (Warren, unpub. data), only limited quantities of ice-contact stratified drift occur in places inferred not to have been reached by the later, northeast, ice. The Qcd_1 material is not all contemporary, but all of it is probably older than any of the Qcd_2 material.

The melt waters from the late readvance of the ice deposited much larger quantities of ice-contact stratified drift. The earlier deposition (Qcd_2) was chiefly in the valley of Still River; drainage was apparently southward through a spillway at the head of Still River, 1.3 miles west of Torringford Church in the Torrington quadrangle (Colton, unpub. data).

Glacial Lake Winsted: Stage 1.—Gravel is found at the west edge of Forest View Cemetery. The gravel grades through medium sand to very fine sand down the slope to the east. This gradation, the surface slopes, and the location relative to Mad River indicate that the material is a remnant of a delta formed by Mad River into a lake in the valley of Still River. Evidently ice still blocked the valley farther north when the last ice melted out at Winsted, so that a glacial lake was formed. This lake may be called glacial Lake Winsted.

Hobbs (1901, fig. 2, stage 3) inferred a Pleistocene lake in this location. He believed that the lake occupied a south-draining valley dammed by drift, but the rock valley slopes and widens northward (Hobbs, 1901, fig. 1), and Colton (unpub. data) shows rock not drift, at the site of Hobbs' inferred dam.

Lake Winsted may have continued to spill southward through the spillway at the head of Still River; this is floored with rock and stands today at about 735 feet. Alternatively, if postglacial tilting in this area has been at the rate of 4 or 5 feet per mile, the till divide at St. Joseph Cemetery may have been lower than the rock gap at the head of Still River, so that when the ice cleared from lower Mallory Brook, the lake could spill eastward (spillway ?1 on the map). The divide has been so much modified, in cutting for the grade of the old Connecticut Western Railroad (later the Central New England Railway) and in later refilling for highway grades, that the precolonial contour and elevation cannot now be determined.

Wherever the outlet, the lake level at the latitude of Winsted evidently stood near 750 or 755 feet long enough for Mad River to build the Qd_1 delta at For-

est View Cemetery. The terrace 1,000 feet northwest of the corner of State Route 8 and US 44 also stands at about 755 feet, and doubtless records the same episode.

Deposits of gravel and sand that extend westward up Mad River to near the confluence of Colebrook Brook (Qio) probably record deposition of inwash graded to this same baselevel, and perhaps also of outwash from ice near the site of Colebrook village. The northwestern end of this deposit, just southeast of the stream-gaging station, rises to nearly 795 feet. The preserved remnants farther down Mad River fall on or below a reasonable profile sloping southeastward from this elevation to the delta.

Glacial Lake Winsted: Stage 2.—As melting continued, a lower outlet was uncovered, at the Winchester-Barkhamsted town line north of Route 20 (spillway 2 of the map). The floor of this spillway has been eroded down to bedrock and stands today at about 745 feet. In relation to Forest View Cemetery it was then some 10 or 15 feet lower than it is today. Thus the lake level dropped some 15 to 25 feet between the time the Qd_1 delta was deposited and the time outlet 2 was cut down to bedrock.

As the lake level dropped to the level of the toe of the Qd_1 delta in the narrows west-northwest of Wallens Hill, glacial Lake Winsted became segmented into two separate lakes. The drainage from the southern lake doubtless followed the crease between the east-sloping delta and the till slope east of it.

This stream would be expected to erode the eastern toe of the Qd_1 delta and build a new, lower delta into the northern lake. The north-sloping terrace (Qd_2) at between 730 and 740 feet elevation, 3,700 feet north of the corner of State Route 8 and US 44, has the form and approximately the elevation appropriate for a remnant of the delta thus formed; the northward slope may reflect northward shifting of the locus of deltaic deposition as the lake level gradually dropped during erosion at outlet 2. Much of this Qd_2 delta is sand.

The relatively flat area of stratified drift (Qde) that surrounds the 755 rock knob in the cemetery 1,800 feet northwest of the intersection of State Route 8 and US 44 may record lateral planation at this time by Mad River, though it could also be controlled by superposition across bedrock in the ridge.

Glacial Lake Winsted: Stage 3.—With still further melting, yet a lower outlet became available, near the northeast corner of the town of Winchester (spillway 3). This spillway may have been localized initially as an ice-marginal channel between the ice front and the north slope of the till hill, but it soon became incised in the till.

The elevation of the initial till surface at this spillway cannot now be determined. The immediate drop in lake level when drainage was established there may have been only a few feet. However, because the till at this site apparently happened to contain few boulders (the spillway lacks the lag armor of residual boulders usually present in melt-water channels), the outlet may have been cut down rapidly. In response to the dropping lake level, Mad River must have built a still lower sloping delta; the terrace (Qd_3) at about 705 feet elevation, 4,800 feet north of the intersection of State Route 8 and US 44, is inferred to be a remnant of this deposit.

Stratified drift postdating Lake Winsted.—Glacial Lake Winsted was finally drained when the ice melted enough to permit drainage via the present course of Still River. The extensive ice-contact stratified drift deposits (Qcd_3) from above Robertsville to Riverton and along West Branch Farmington River must date largely, and perhaps entirely, from the period after Lake Winsted was drained. At some time during the erosion of the delta materials at Winsted, Mad River discovered and reoccupied its preglacial valley, draining east toward the intersection of State Route 8 and US 44.

LATE GLACIAL AND POSTGLACIAL DEPOSITS

After the ice had cleared the Sandy Brook valley, in latest Pleistocene or Holocene time, two tributaries of Sandy Brook built fans (Qf). Probably most and perhaps all of the material of those river terraces (Qst_1) that stood above the level of the record flood of 1955 (Bogart, 1960) is stratified drift of Pleistocene age, but the lower terraces (Qst_2) that were flooded in 1955 must carry at least a veneer of Holocene alluvium; several feet of alluvium are present on the terrace north of West Branch at the point where it leaves the east edge of the quadrangle.

After the ice disappeared from this area, streams deposited alluvium in most valleys. Undecomposed to partly decomposed organic material has accumulated in swamps and marshes that occupy depressions and poorly drained parts of the drift surface. Man has made many changes in the land during the last two centuries. Only the larger fills and larger graded and alluvial areas are delineated on the map.

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